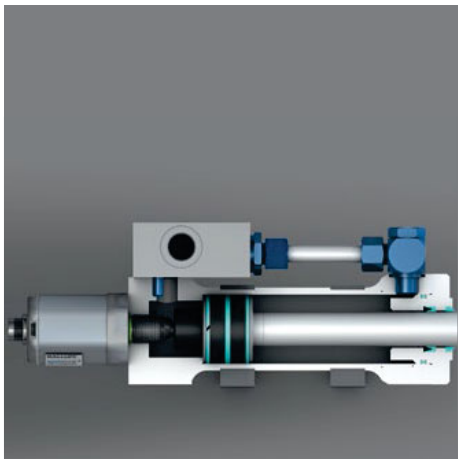
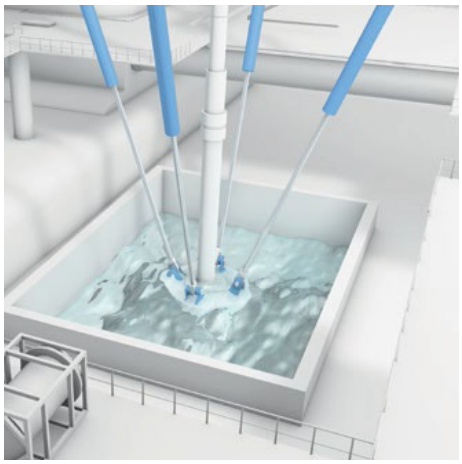
BALLUFF

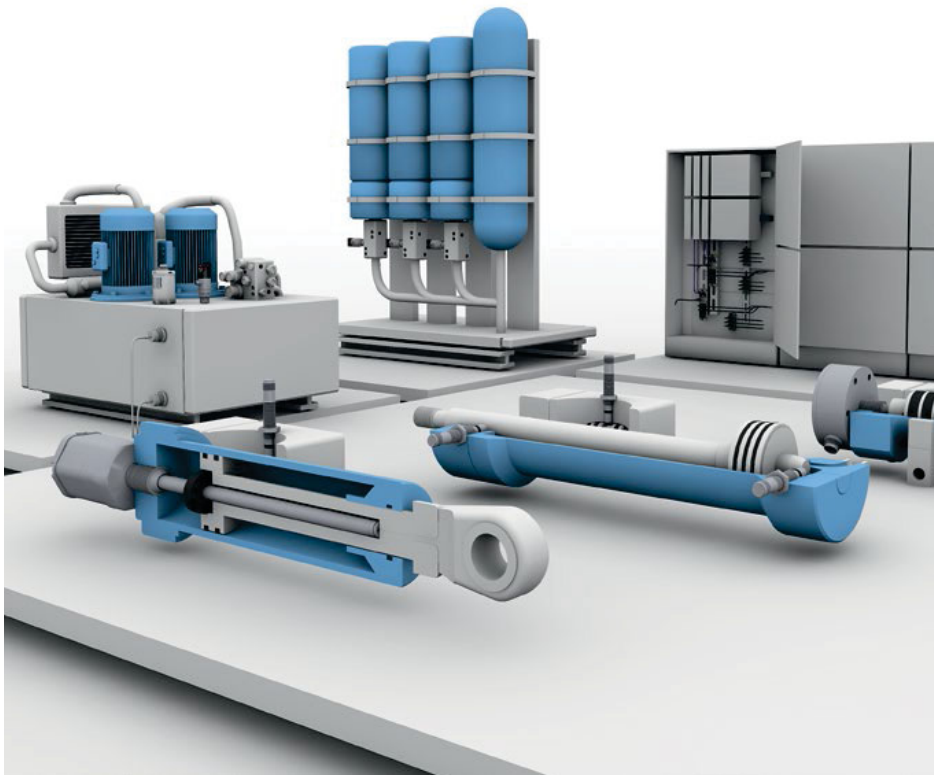
sensors worldwide

Sensors for Hydraulic Systems

Measurement detection for a wide range of applications







With over 50 years of sensor experience, Balluff is a leading global sensor specialist with its own line of connectivity products for every area of factory automation. Balluff is based in Germany and has a tight international network of 54 representatives and subsidiaries.

Balluff stands for comprehensive systems from a single source, continuous innovation, state-of-the-art technology, highest quality, and greatest reliability. That's not all: Balluff also stands for exceptional customer orientation, customized solutions, fast worldwide service, and outstanding application assistance.

High-quality, innovative products tested in our own accredited laboratory and a quality management system certified according to DIN ISO 9001 (EN 2008) form a secure foundation for optimized added value for our customers.

Whether electronic and mechanical sensors, rotary and linear transducers, identification systems or optimized connection technology for high-performance automation, Balluff masters not only the entire technological variety with all of the different operating principles, but also provides technology that fulfills regional quality standards and is suitable for use worldwide. Wherever you are in the world, Balluff technology is never far away. You won't have to look far for you nearest Balluff expert.

Balluff products increase performance, quality and productivity around the world every day. They satisfy prerequisites for meeting demands for greater performance and cost reductions on the global market. Including in the most demanding areas. No matter how stringent your requirements may be, Balluff delivers state-of-the-art solutions.

Benefit from comprehensive sensor expertise from a single source. Achieve solutions suited to your requirements.

Balluff Sensors Support High Power Density

First-class quality is durable, robust and has a wide variety of uses.

When great forces and torque are to be generated, hydraulic systems are used. They enable compact design and, therefore, high power density. They are self-lubricating, robust and provide long-term stability.

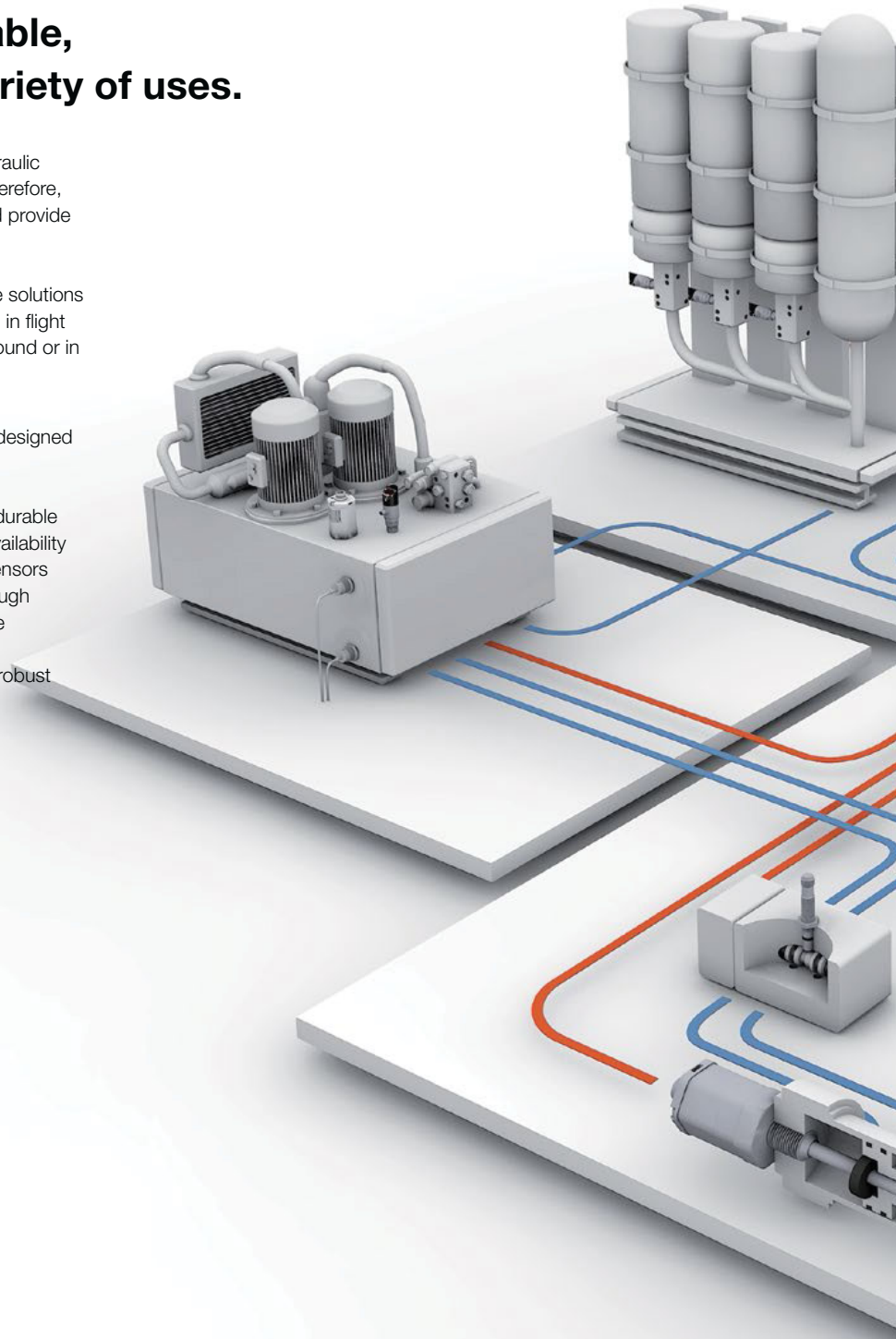
With the suitable sensors, the hydraulic systems provide solutions for almost every application. From the super-fast control in flight simulators to the most heavy-duty applications underground or in tunnel construction.

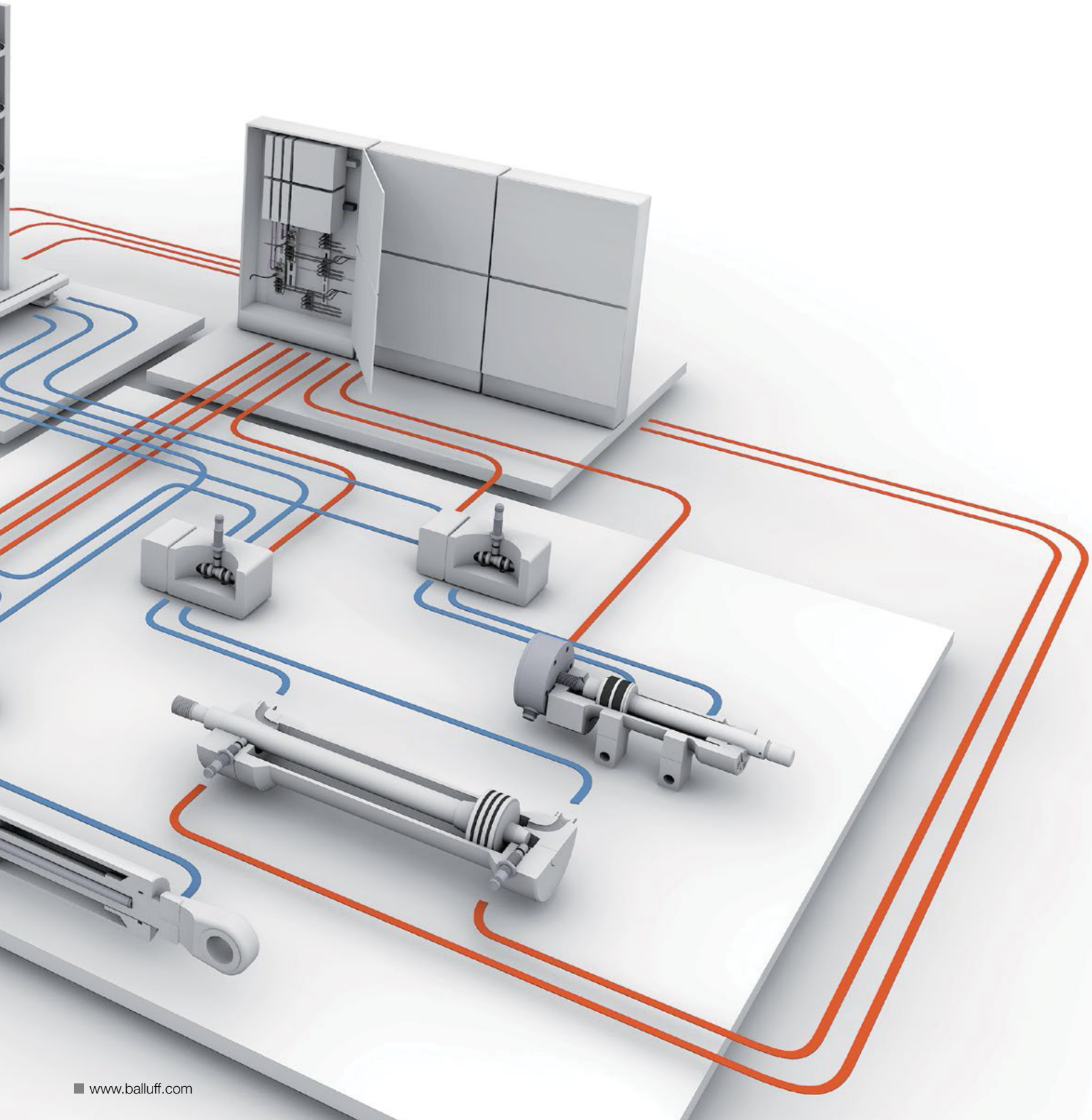
Balluff sensors and position measurement systems are designed for this wide range of applications.

Whether individual applications or large-scale projects, durable and robust Balluff technology supports the maximum availability of systems and supports their long service life. Balluff sensors are optimized in our accredited in-house laboratory through Highly Accelerated Life Tests (HALT). While doing so, the products are already subject to extreme loads during development, possible weak points are removed and a robust product design is ensured. Through extremely durable products, Balluff offers first class quality for all areas of hydraulics:

- Products for position sensing and end position detection in hydraulic cylinders and valves
- Capacitive sensors for monitoring liquids
- Pressure sensors for monitoring the hydraulic circuit
- Network and connection technology for industrial communication
- Worldwide locations with technical consulting, sales, after-sales service and spare parts supply

Balluff works closely with suppliers of subsystems, plant engineers and research institutes to achieve this.



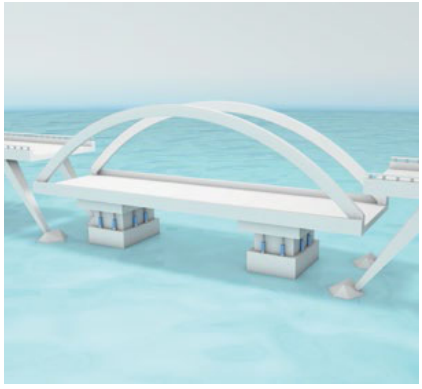


Civil Engineering – Mass Under Control

When every second counts or when heavy loads need to be precisely positioned, high-quality technology offers long-term stability.

Constantly expanding our infrastructure is nearly unthinkable without hydraulics. With hydraulics, new waterways are accessible. Tides and level differences are controlled by locks and road networks are expanded. New tunnels and bridges are developed. Hydraulic systems are used all over the world for controlling machines and plants. Even under the most extreme conditions. Balluff position measurement systems and sensors offer perfection because they are highly precise and exceptionally durable.

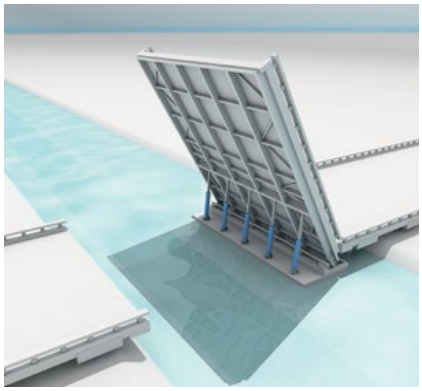
Positioning heavy bridges



When building bridges, special heavy-duty cylinders carry out horizontal feed and vertical lifting motions to move the bridge elements, which weigh multiple tons. The Micropulse transducer rod CD is installed in the pressure area of heavy-duty cylinders and high pressure cylinders to position these extreme loads synchronously and with millimeter precision.

- For pressures up to 1000 bar
- Resolution down to 1µm for synchronous positioning with millimeter precision
- Ex area zone 2; non-incendive "nA"

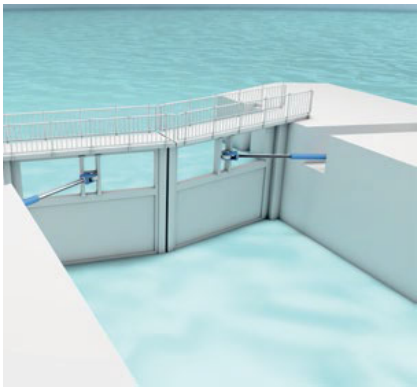
Lifting and lowering bridges



Every second counts when raising and lowering movable bridges, as impact on traffic must be kept to a minimum. High-precision position measurement systems integrated into the hydraulic cylinders ensure that the bridge raises and lowers quickly and efficiently. High-pressure resistant inductive sensors reliably identify the end position of the cylinder.

- Position and speed detection
- High-pressure resistant rated to 500 bar
- Cost-effective solution for monitoring end positions

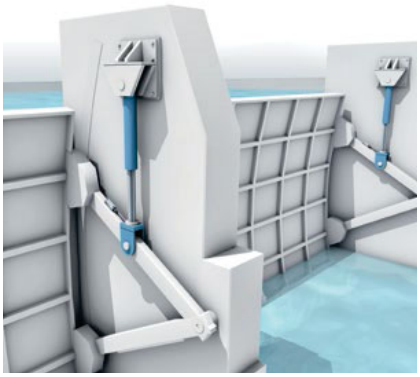
Opening and closing locks



Hydraulic cylinders move the powerful gates of the large locks, which can take on enormous dimensions in seaports. BTL ProCompact HB transducers are used in hydraulic cylinders to exchange the water efficiently and monitor the position of the gates.

- Stainless steel for use in coastal areas with a cable guard system, can also be temporarily used under water
- Nearly limitless service life through an effective contact-free principle

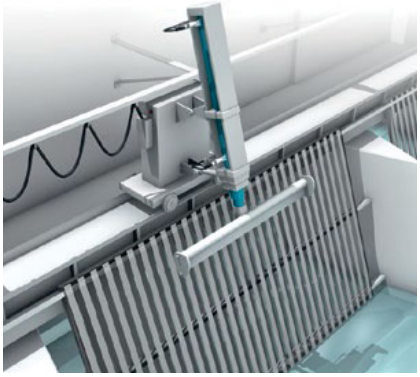
Controlling the gates



The requirements for a weir go much further than just opening and closing the gate. Fish ladders must be taken into account and the fully automatic control of the water level must be ensured. BSI inclination sensors reliably and precisely measure the intermediate position of the gate.

- Absolute angle tracing for exact positioning
- Wide temperature range for outdoor use
- Metal housing and high degree of protection – ideal for harsh environments

Detecting rake cleaner end positions



Floating debris at the infeed end of hydroelectric power plants causes efficiency loss and thus diminishes cost-effectiveness. The worst-case scenario could result in plant downtimes with high costs. With the high-pressure resistant inductive sensors BHS, the end positions on the rake cleaner can be easily and reliably detected.

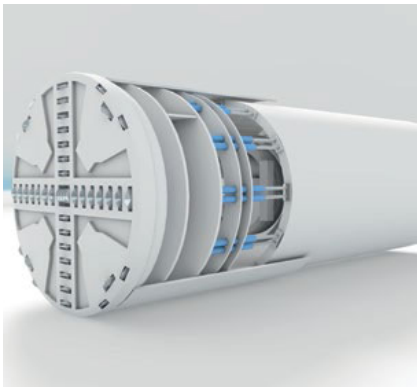
- High pressure rating
- Easy to install
- From M5 to M18 – for all cylinder types

Mining and Open-pit Mining/ Raw Material Extraction

Durability is a given.

Whether under or above ground, sensor requirements are extensive. Temperatures are high deep underground. There are also extreme vibrations and shock loads. Under these conditions, durable and resistant technology is a must.
Balluff offers the best security for position measurement in mining;. through robust, wear-free and high-precision position measurement systems and over 25 years of experience in this field.

Tunnel construction – Controlling pushing cylinders



Tunnel boring machines remove rock centimeter by centimeter. Pushing cylinders, which continuously force the drill head into the rock, provide the strength needed for this. Micropulse transducers BTL correctly report the piston position and allow for a smooth drilling process.

- Reliable
- Wear-free: long life for the highest system availability
- Vibration-resistant: for use under extreme conditions

Positioning drills

Always know where the driller is:
When searching for new raw material supplies, soil samples are taken with mobile drillers to confirm potential deposits. Micropulse transducers BTL PF ensure reliability for the correct drilling depth.

- Flat design, space-saving for mobile machines
- Robust profile housing
- Wear-free, since it is contact-free with up to 15 mm distance from the position magnet to the transducer

Monitoring drill depth

In raw material extraction, Micropulse BTL profile position measurement systems installed outside the cylinders monitor the drilling of the blast holes below ground. This is the only way that safe and reliable tunnel mining and efficient raw material excavation can be ensured.

- Easy installation and fast exchange, since they are externally attached
- Extremely robust against shock and vibration
- Reliable, even at high ambient temperatures

Supporting longwall mining

In mining, shields prevent rocks from falling in the working area and injuring miners. To support longwall mining, hydraulic cylinders are used. Micropulse BTL position measurement systems of the K series integrated in the hydraulic cylinders provide exact positioning and secure monitoring of the shields.

- Compact design
- Explosion-protected versions made from stainless steel

Steel and Metallurgical Industry – Continuous Processes Around the Clock

Reliably manage high temperature, shock and vibration.

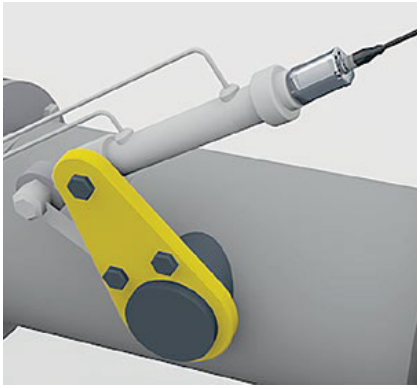
The production of steel is highly complex and is carried out using high temperatures, shock and vibration under the most difficult conditions. This places high demands on producers and mechanical engineers. Ensuring a safe and reliable process with optimal quality management is critical. A fundamental prerequisite for this is the highest quality of systems and machines. Balluff offers optimal, internationally approved sensors, as well as corresponding network and connection technology.

Coke oven – Controlling movements

The Micropulse transducer BTL in the hydraulic cylinder controls all movements at the coke oven battery up to 100°C. Its robust metal housing with IP 67 and PTFE cable for up to 200°C makes it ideal for particularly hot environments.

- High-temperature resistant for use on the coke oven battery
- Metal housing in IP 67
- Different interfaces

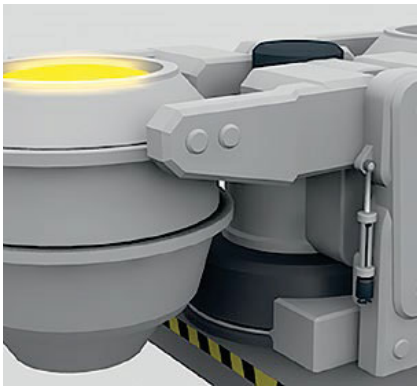
Blast furnace – Controlling air and gas supply



Micropulse transducers BTL are used for controlling flaps and valves on the blast furnace in order to regulate the supply and exhaust air during production of pig iron. Alternatively, standard inductive sensors BES deliver convincing performance. Additional security: A temperature sensor is integrated in the electronics head for all micropulse transducers BTL with a bus interface. This guarantees the correct temperature measurement.

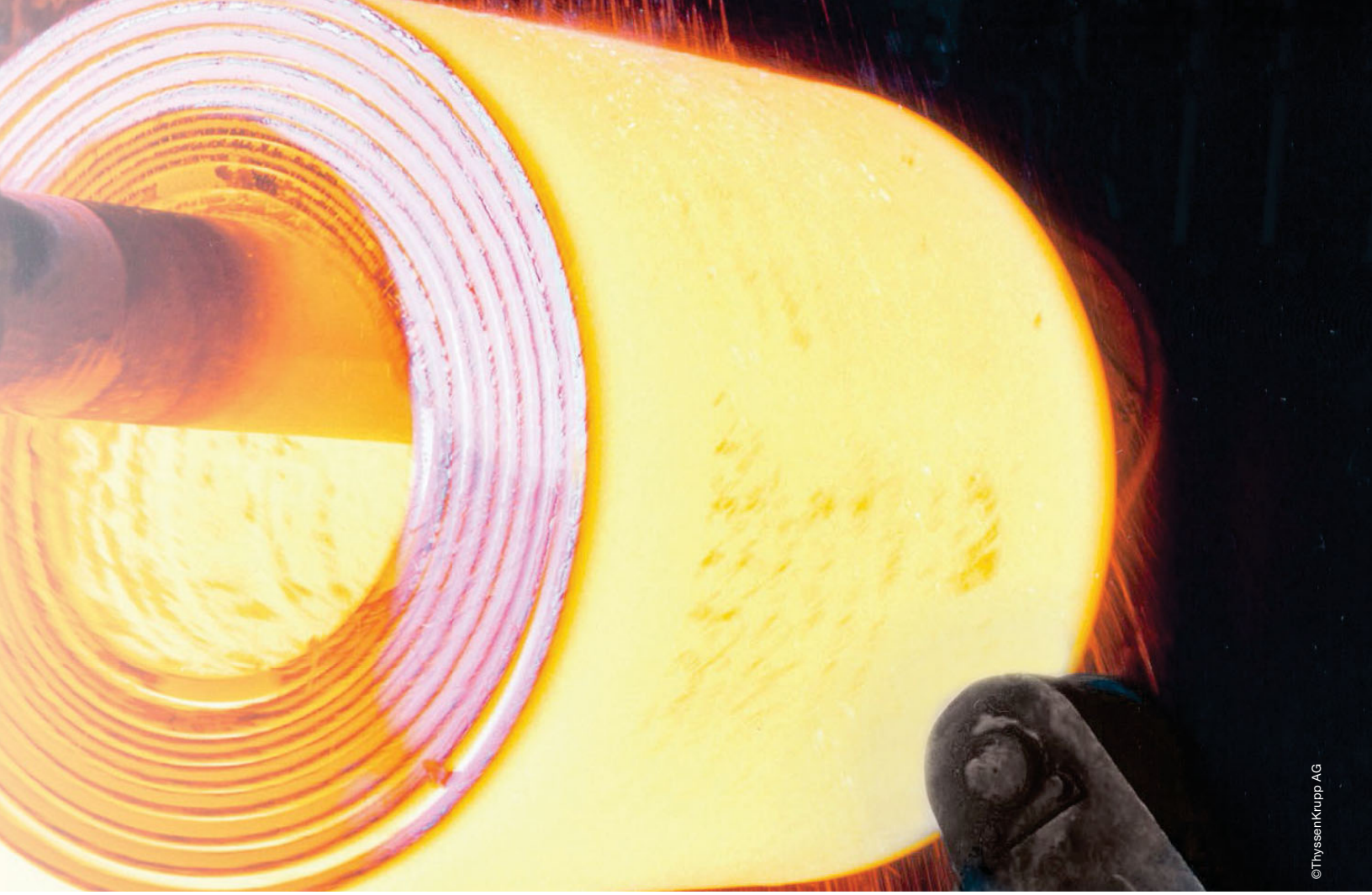
- Temperature measurement integrated in the transducer
- Explosion protection versions
- Non-contact operating principle

Monitoring ladle movements

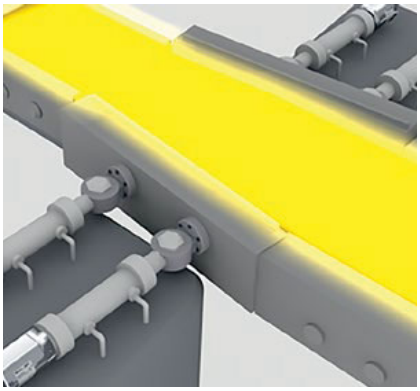


Ladles ensure replenishment of steel in production. Optimal control over the process and ensuring the addition of the correct quantity of steel in the continuous casting line is only possible through precise ladle movements. Micropulse transducers BTL7 (double and triple-redundant) provide absolute security and the best reliability for the continuous casting process.

- Redundancy for absolute security
- The highest availability through completely independent systems in one head
- Easy to retrofit, since it is compatible with the standard BTL



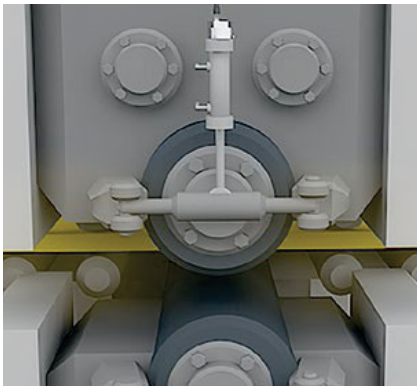
Controlling the slab guidance



Micropulse transducers BTL in the hydraulic cylinder are ideal for positioning and guiding the slabs. They check for the correct configuration of the lateral guides and accompany the slabs on their path through the rolling stand. The large forces in the reshaping are reliably compensated for in this process.

- Rapid Replacement Module (RRM) for fast changes without interrupting the hydraulic circuit
- Vibration and shock resistant

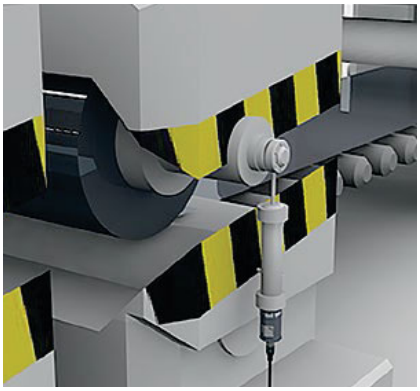
Setting the roll gap



The roll gap can be set with high accuracy using the Micropulse transducer BTL in IP 69K during hot or cold rolling. The vacuum-sealed BTL does not require any additional protection for continuous water cooling of the rolling stand.

- Outstanding accuracy for precise work
- Stainless steel housing for tough applications
- Vacuum sealed, even during constant water cooling

Positioning the rollers



Micropulse transducers BTL guarantee high accuracy when winding the coils. The pressure roller is guided, for example, depending on the roll diameter.

- Absolute output signal
- Extremely exact for precisely guiding pressure rollers
- Also with IO-Link for easy wiring

Stamping and Pressing – Consistently

Ensuring consistent product quality means constantly monitoring every movement.

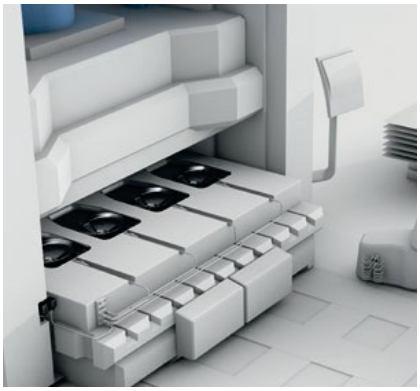
Whether in the automotive industry, the rubber industry or when processing wood and composite materials, such as carbon fibers: presses are indispensable in today's industry. They are used to manufacture metal parts of all kinds. Particle boards for house construction and carbon fiber body parts for the cars of tomorrow. In individual parts production or on long press lines that ideally work continuously 365 days a year. While doing so, great repeat accuracy and continuously high precision is required. The extensive Balluff portfolio fulfills all requirements.

Pressing metals

Productivity and flexibility are important goals of the automotive supply industry. Micropulse transducers measure the movements of the press with absolute precision. For a wide variety of moldings. For every part produced. This supports the production of a wide variety of lot sizes and optimal processes.

- Different designs for external or internal installation
- Multifaceted mechanical accessories
- Various interfaces for easy connection to the controller

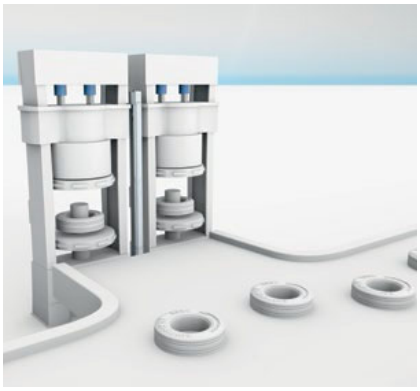
Forming composite materials



When producing components from carbon-fiber-reinforced plastic (CFRP), the carbon fibers that are woven to mats are pressed into shape under heat and pressure. In this process, they must be monitored and harden uniformly. Micropulse transducers ensure uniform pressure with every press-fitting process without being impeded by heat.

- High temperature range
- High repeat accuracy
- Also has multiple position encoders to monitor both sides of the press

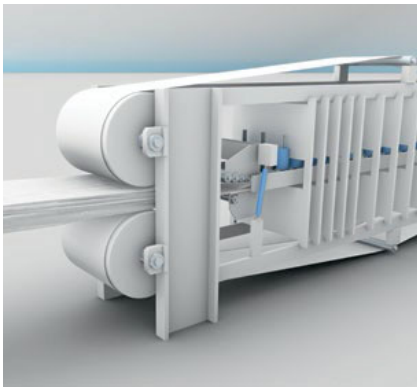
Vulcanizing tires



In hydraulic heat presses, green tires receive their correct shape. It is important to achieve consistent quality. Micropulse transducers BTL ensure high repeat accuracy and the exactly identical result at all times. They satisfy the highest requirements of the manufacturing process.

- Contact-free measuring principle for maximum service life, even with short cycle times
- Extremely precise for consistent quality
- Profile housing for easy installation

Monitoring parallelism of the presses



Up to 60 cylinders ensure an optimal result in fiberboard systems. The Micropulse transducers integrated in the hydraulic cylinders monitor closing height and parallelism of the press with outstanding reliability. Therefore, the dimensions of the particle boards can be successfully maintained. The high ambient temperature does not affect the transducers.

- Explosion protected
- Extended temperature range
- Can be installed in the cylinders

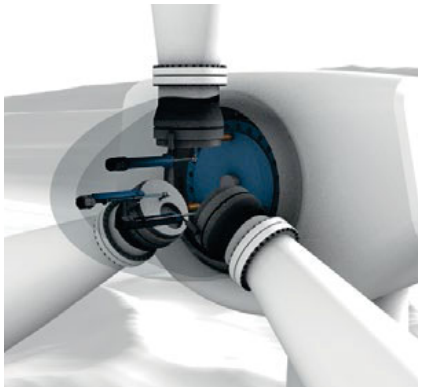
Sensors for All Areas of Power Generation

The extensive performance spectrum offers advantages for renewable energy and conventional solutions.

Climate change, demographic trends and the limited availability of fossil fuels have led to new solutions in the energy industry: to offshore wind farms or solar power plants in the desert. The distribution of power generation leads to a large number of individual systems and the immediate influence of extreme environmental factors place stringent requirements on the quality of the components used.

Whether renewable energy or the conventional power generation, Balluff products are used in all areas. Balluff sensors and systems feature excellent quality. Their security, durability and reliability are true hallmarks.

Adapting pitch to the wind speed



Balluff position measuring systems BTL were developed specifically for use in the hydraulic cylinders of wind power plants. Using the systems' pitch adjustment, the rotor blade angles can be adapted accurately to the wind speed to maximize power generation and ensure plant reliability.

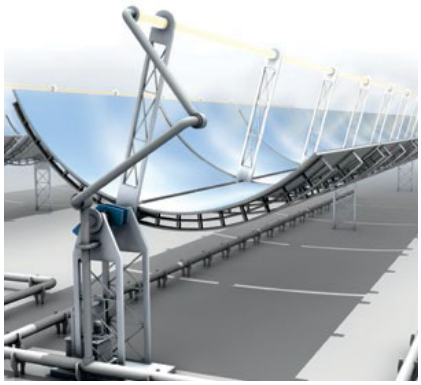
- Contactless = low-maintenance
- Pressure rated to 600 bar
- Vibration and shock-resistant for stable use in adverse conditions

Adjusting guide and rotor blades

The guide and rotor blades on Kaplan turbines can be adjusted with help from BTL micropulse transducers. For example, a BTL profile controls the position of the guide vanes as needed. Another BTL integrated in the shaft ensures optimal adaptation of the impeller to the water volume.

- No reference run required after voltage interruption
- Rugged, non-contacting
- High protection class
- Pressure-rated for installation inside hydraulic cylinders

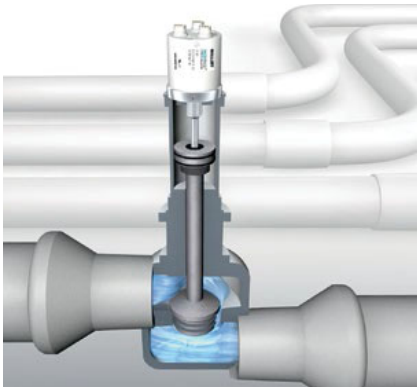
Tracking the sun with parabolic troughs



With the parabolic trough power plant, collectors concentrate solar energy onto a receiver tube positioned in the focal line and heat up the oil flowing in it. For high efficiency, all troughs have to be continuously adjusted to follow the sun's path and be focused exactly on the receiver tubes. This is achieved by magnetically coded position and angle measurement systems BML that are positioned directly on the rotating shaft.

- Direct measurement
- Precise position detection
- Determining reference points

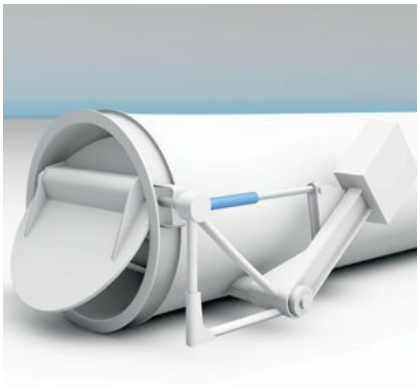
Monitoring valves



The highest safety requirements for emergency shutoff control valves require redundant systems. In compact redundant Micropulse transducer BTL 7, up to three independent measurement sections and three independent electronics systems are integrated in a rod. The robust, absolute position measurement system is freely configurable and easy to operate.

- 2 or 3 completely separate systems in one housing for maximum safety
- Compact and space-saving
- Non-contact and wear-free
- Monitoring of all channels via LEDs

Controlling flaps



Flaps are used in all areas of power plants to control gases and fumes. Robust hydraulic cylinders with the position measurement system BTL reliably open and close the flaps and support safe operation of the power plant.

- Additional temperature range for outdoor use
- Can be installed in the cylinders
- Reliable

Controlling diverter positions

Diverters guide gas turbine fumes. Either to the bypass chimney or to the steam generator. With help from hydraulics and micropulse displacement sensors integrated in them, the diverter can be opened or closed in increments.

- Ex-variants for use in the potentially explosive areas
- Compact design suitable for dynamic applications

Wood and Pulp Industry – Full Coverage

Raw boards to fine paper: innovative sensor technology masters different requirements.

Wood is a multi-use material. Processing ranges from raw boards to fine paper. The wood and paper industry has a wide array of requirements for this reason. In forestry and in the sawmill industry, sensors are subjected to the harshest ambient conditions and must work with the highest reliability. Precise, smart sensors and position measurement systems are used in wood processing and paper machines for an efficient machining process.

Balluff fulfills the entire range of requirements of the wood and pulp industry. Innovative sensor technology is robust, precise, reliable and enables fast, automated processes.

Monitoring hydraulic cylinders

Sensors for debarkers are exposed to strong vibrations. Transducers in hydraulic cylinders monitor the piston position of the infeed unit. This enables logs of different thicknesses to be optimally fed.

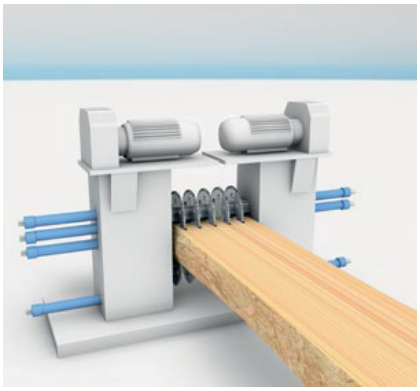
- Reliable, with high protection class
- Rugged housing
- Direct signal evaluation or in conjunction with processor units for all control and closed-loop systems

Positioning logs

Vertical band saws adjust to maintain the desired board thickness after each cut. Micropulse transducers are excellently suited to configuring these settings quickly and with great versatility.

- Pressure-resistant for integration in hydraulic cylinders
- High repeat accuracy
- Electronic head can be replaced in the event of service

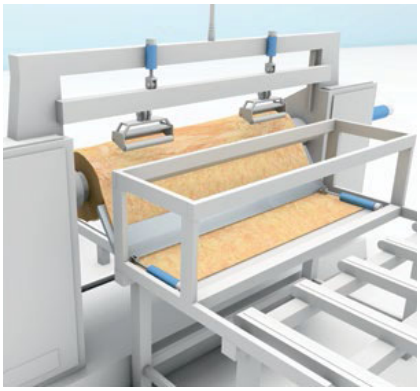
Adjusting the saw blade



Saw units with single-blade adjustment make it possible to change the cross-section extremely fast. Hydraulic cylinders control the saw blades and Micropulse transducers reliably and accurately return the position. As a result, using them supports optimum exploitation of the wood.

- Multiple position encoders are possible
- Vibration-resistant

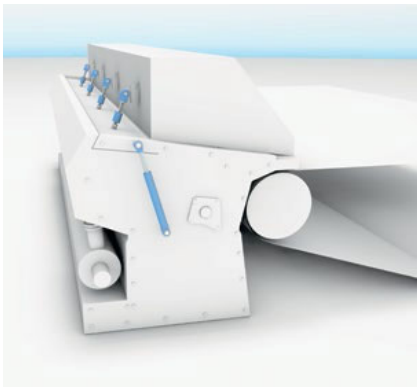
Tracking the peeling knife



In veneer production, logs are peeled layer by layer. For an optimal result, contact pressure and the position of the peeling knife must be precisely controlled. This can only be successful through smart cylinders with a built-in position measurement system BTL.

- Pressure - resistant for integration into hydraulic cylinder
- Shock resistant
- IP 67 metal housing – protection against swarf, sawdust

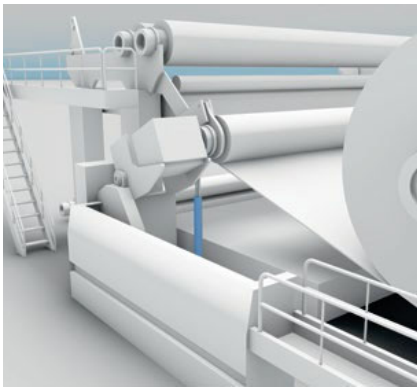
Hydraulically controlling the head box



For paper production, hydraulic components must often work reliably under aggressive ambient conditions. For example, the headbox evenly applies the stock suspension on the wire mesh and thus influences the paper quality. Deckle plates and headbox bottom lip are hydraulically controlled. Precise position measurement systems in hydraulic cylinders ensure an optimal result.

- For use in aggressive environments: sensor head made from stainless steel
- Tolerant of vibration
- IP 69K

Controlling the winding process



Produced paper is wound up around large rolls. At high production speeds, these rolls grow very fast and become extremely heavy. The most up-to-date hydraulic and position measurement technology ensures the best possible winding process. Micropulse transducers BTL that are securely packed in the hydraulic cylinder report the position.

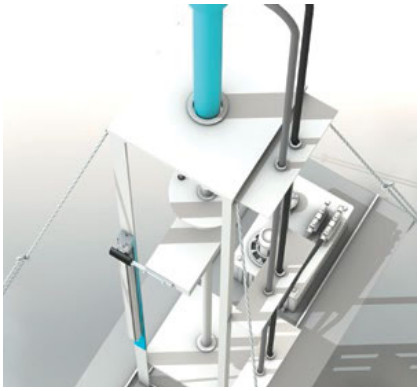
- Wide variety of interfaces
- High sampling rates are possible

Oil and Gas Extraction

Reliability, Accuracy, Safety.

In the oil and gas extraction, transport, and refining industries, productive uptime is critical. Equipment must operate reliably despite often harsh operating environments and routine physical abuse. Balluff's hazardous location position sensors are specifically designed to meet oil and gas industry expectations for high survivability. These robust devices are optimized for accurate and continuous absolute position feedback on hydraulic cylinders used as prime movers on valves, pumps, positioners, and tensioners. Offering the widest range of hazardous location certifications available, Balluff position sensors alleviate regulatory compliance concerns regarding application and deployment around the world.

Monitoring artificial lifts



After tapping an oil field, crude oil pumps do their work entirely autonomously for the most part. Pump parameters are continuously monitored via sensors and, usually, via automated remote systems. Balluff Micropulse transducer profiles prove themselves in the difficult application directly on the pump and guarantee reliable monitoring of position and path.

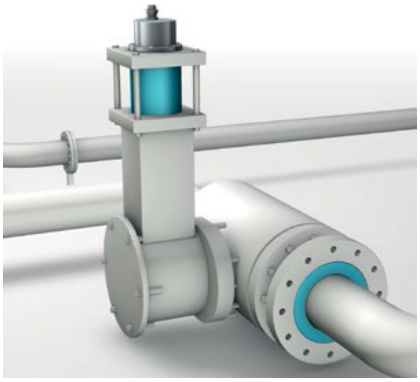
- Robust design
- Exact measurement of path and position
- Up to 7.6 m in length

Positioning artificial lifts

To minimize load and wear, crude oil pumps have to be aligned exactly over the drill hole. Balluff inclination sensors BSI are ideal for use in harsh outdoor environments. Thanks to their analog angle values, the pumps can be positioned with extreme precision.

- High protection class IP 68 – suitable for use under rough conditions
- Precise, absolute angle measurement
- Compact housing

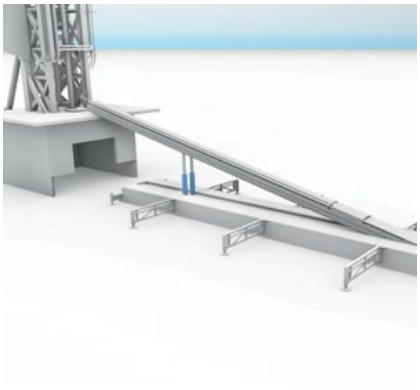
Controlling valves



Control and shutoff valves are used in many areas of oil and gas extraction, in refineries, as well as in petrochemical plants. They must reliably work in very harsh environments. In corresponding vulnerable environments, explosion protection is a top priority. The certified Micropulse position measurement systems BTL ensure reliable and secure use.

- High reliability
- NEC, CSA, ATEX, IECEx and many additional international approvals

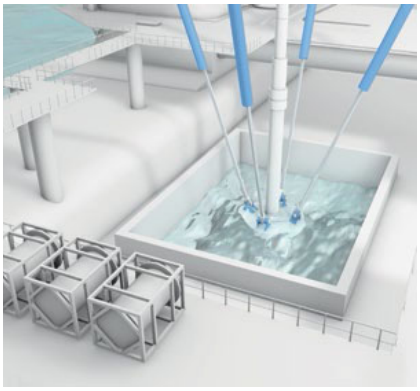
Positioning drill pipes



Pipehandlers take drill pipes out of the magazine and position them directly over the borehole. Quick and efficient drilling is thus ensured. Powerful hydraulics move the heavy rods with ease and bring them directly into place and position. Balluff position measurement systems are critical for prompt, correct positioning.

- Wide temperature range
- Long-lasting
- Robust

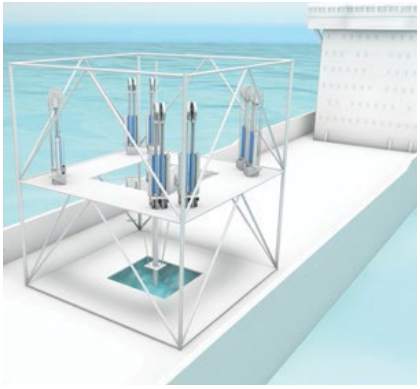
Drilling riser – Monitoring tension



Compensation cylinders must maintain a specified tension of the marine riser and balance all fluctuations. To do so, the hydraulic cylinders are attached between tensioner ring and rig and equipped with position measurement. These smart hydraulics level the sea movement and ensure continuous tension of the production riser, independent from the upward and downward heave of the floating drilling rig.

- Length 6 to 7.6 m
- Explosion protected in the stainless steel housing

Holding wire-line tension



Wire-lines connect floating drilling rigs to the seabed. These are held under tension at all times to prevent damage. During swelling, tension is hydraulically adjusted to the clamping device. When this occurs, the piston position of the cylinder must be reliably reported back. Micropulse transducers BTL execute this perfectly.

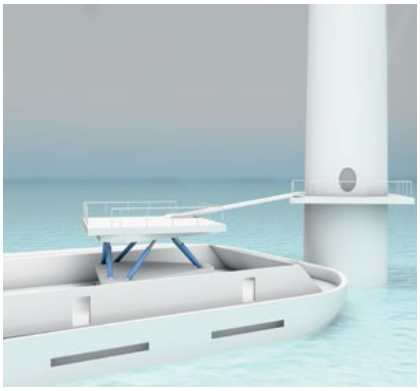
- Wide variety of interfaces
- Space-saving with installation in the cylinder
- Non-contact and wear-free

Offshore and Ship Technology– Weathering with Winds and Waves

High swelling, strong breezes and aggressive salt water are always factors to control.

When building a ship, heavy-duty is the order of the day. To easily move the enormous loads, hydraulics are superior to other solutions. Hydraulic systems are also required to make ships jut out into the sea and stay on target. Balluff offers suitable sensors for the rough sea climate. With maximum reliability and durability. From propeller adjustment via stabilizers to various superstructures.

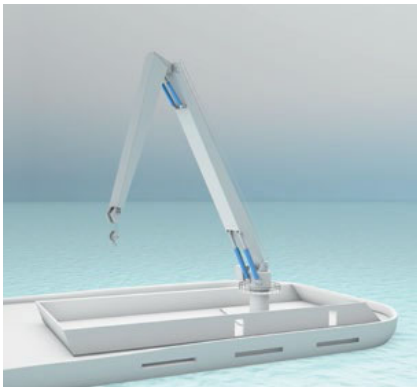
Compensating motion



Security on the sea: Even with swelling, people from the supply vessel can safely reach the platform or the offshore wind power plant.
Smart hydraulics with a triple-redundant position measurement system compensate for all boat movements and allow for safe access.

- Redundant for maximum security
- Rule-compatible – perfectly suitable for complex control

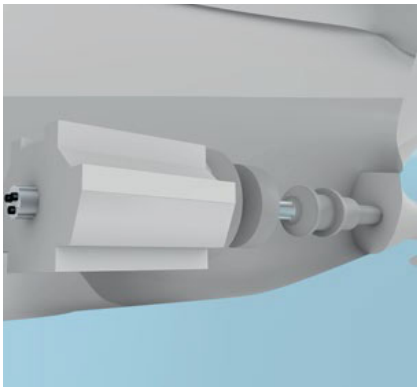
Lifting loads



Cranes are used not only in the harbor, but also on the sea. So that safe work is possible, hydraulics and sensors attuned to the harsh sea are needed. Thus, explosion-protected high-pressure resistant inductive sensors reliably measure the end position of the offshore crane, even with high swelling.

- Flameproof up to 500 bar
- Wide portfolio for installation in every cylinder type
- High-temperature versions

Controlling variable pitch propellers



Variable pitch propellers bring critical advantages to the ship propulsion system. This is particularly worthwhile when there are frequently changing speeds, such as on ferries or cruise ships. Angle adjustment is hydraulic and is controlled by triple-redundant Balluff position measurement systems.

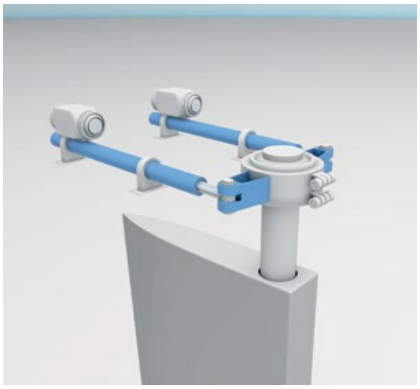
- Compatible with retrofit of safety
- status LED, 3x
- GL approval (Germanischer Lloyd)

Ensuring maneuverability

Jet engines are always used if high speeds on the heavy seas or maneuverability in slow travel are required. Hydraulic cylinders move the infeed flap and nozzle to adjust to direction and speed. Micropulse transducers integrated in the cylinders reliably measure movement.

- Can be completely integrated into the cylinder
- Stainless steel
- Accessories for the pass-thru of the cable through the cylinder (stainless steel, IP 67)

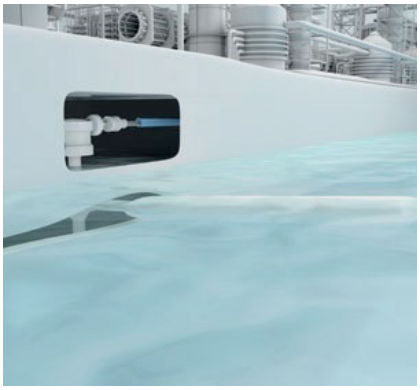
Adjusting ship rudders



To keep a ship on target, the ship rudder must be continuously adjusted. This is successful with reliable and high-precision Balluff position measurement technology. Position measurement systems BTL rod (integrated in the hydraulic cylinder) and BTL profile check the rudder position from start to finish and allow for exact readjustment.

- Non-contact
- Protected, because it is integrated in the cylinder
- Rod or profile housing

Controlling ship stabilizers



Particularly cruise ship passengers suffer from rough seas. Stabilizers are used so that the ship fluctuates less, which decreases ship movements. Depending on the position, the optimal fin angle is changed to keep the ship as vertical as possible in the water. The Micropulse transducer HB guarantees the correct adjustment.

- Reliable
- Watertight, IP 69K
- Connector with protective sleeve device

Purposeful Movement on all Levels – Dynamically Controlled

Premium–class position measurement guarantees safe operation.

Whether for development of new vehicles or training for pilots, motion platforms simulate later use and add to safety. Thus, vehicles are already strained to their limits during development to reduce costly, time-intensive tests. Pilots are very well prepared for all flight situations. Additionally, motion platforms in amusement parks allow for the greatest possible driving pleasure.

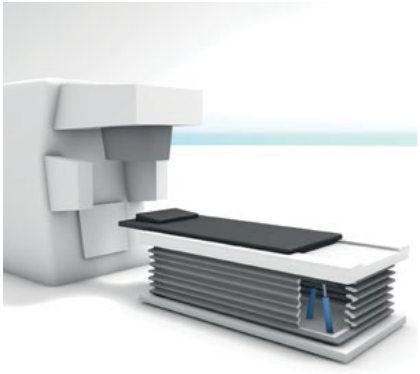
The core of the motion platforms are smart hydraulic cylinders with integrated position measurement systems to guarantee dynamic control and safe operation. Premium position measurement from Balluff is excellently suited to this.

Controlling flight simulators

Highly dynamic hydraulic systems move flight simulators. These simulate real movements to intensively prepare pilots for all possible situations without endangering people and machines. The Micropulse transducer rod supports the extensive training.

- Complete sets to retrofit existing systems
- Many interfaces
- Extremely fast (high sampling rate)

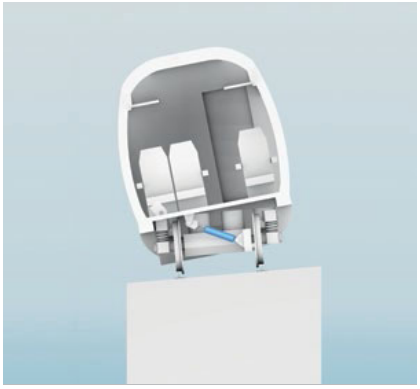
Positioning patients



Prerequisite for an efficient and gentle radiation treatment is, for example, the exact positioning of the patients. Position measurement systems BTL are integrated in the hydraulic cylinders of the hexapods. These systems control movement and enable positioning with millimeter precision.

- High repeat accuracy
- Absolute measuring
- Status LED for operation status display

Controlling train tilt

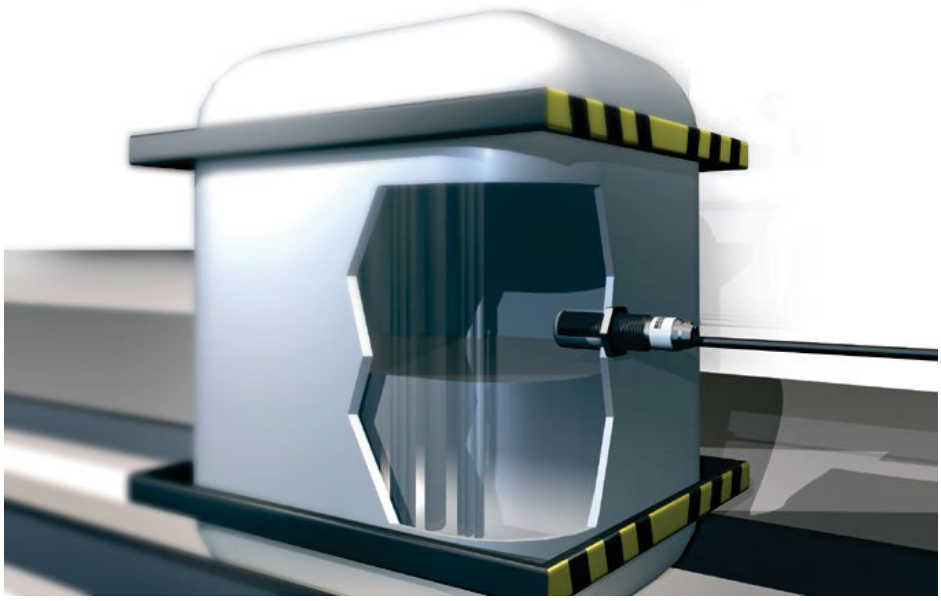


For shortened travel time and high cornering speeds, express trains are actively tilted up to 8°. Hydraulic cylinders with redundant Micropulse position measurement systems are used in inclination technology. For maximum passenger safety and optimal angles in every curve.

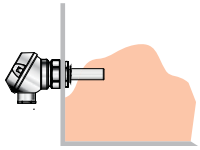
- Also suitable during shocks and vibrations
- Redundant versions for more safety
- Large temperature range

Capacitive Sensors for Level Detection

Cylinder design, DC 3-wire, M12×1, G1/4", 1/4" NPT MicroLevel, M18×1, R3/8", 3/8" NPT

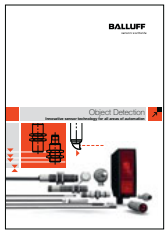


Size		
Order code Part number		
Rated switching distance		
Pressure range		
Selectable PNP/NPN normally open/normally closed		
PNP NO		
PNP NC		
NPN NO		
NPN NC		
Temperature range		
Switching frequency		
Connection		



Adjustment: The adjustment is carried out with a potentiometer. The objective is to set a middle value between the turn-on and turn-off point when the sensor is damped. In individual cases when temperature swings are great and very sticky media are used, a slight readjustment may be necessary. Otherwise, our adjustment instructions for non-flush mount sensor versions apply.

Size		
Order code Part number		
Rated switching distance		
Pressure range		
Selectable PNP/NPN normally open/normally closed		
PNP NO		
PNP NC		
NPN NO		
NPN NC		
Temperature range		
Switching frequency		
Connection		



Information about object detection can be found in our catalog or online at **www.balluff.us**




	M12×1 MicroLevel				G1/4" MicroLevel				1/4" NPT MicroLevel				M12×1	G1/4"	1/4" NPT
	BCS00ZL BCS S44KK01-PSCFNG-EP00,3-GS49	**BCS00ZM** BCS S44KK01-POCFNG-EP00,3-GS49	**BCS00ZN** BCS S44KK01-NSCFNG-EP00,3-GS49	**BCS00ZP** BCS S44KK01-NOCFNG-EP00,3-GS49	**BCS00ZR** BCS S44KK02-PSCFNG-EP00,3-GS49	**BCS00ZT** BCS S44KK02-POCFNG-EP00,3-GS49	**BCS00ZU** BCS S44KK02-NSCFNG-EP00,3-GS49	**BCS00ZW** BCS S44KK02-NOCFNG-EP00,3-GS49	**BCS00ZY** BCS S44KK03-PSCFNG-EP00,3-GS49	**BCS00ZZ** BCS S44KK03-POCFNG-EP00,3-GS49	**BCS0100** BCS S44KK03-NSCFNG-EP00,3-GS49	**BCS0101** BCS S44KK03-NOCFNG-EP00,3-GS49	**BCS0102** BCS S44KK01-GPCFNG-EP02	**BCS0103** BCS S44KK02-GPCFNG-EP02	**BCS0104** BCS S44KK03-GPCFNG-EP02
	Level adjustable				Level adjustable				Level adjustable				Level adjustable		
	10 bar				10 bar				10 bar				10 bar		
	■				■				■				■	■	■
		■				■				■					
			■				■				■				
				■				■				■			
	–5...+105 °C (sensing surface)				–5...+105 °C (sensing surface)				–5...+105 °C (sensing surface)				–5...+105 °C (sensing surface)		
	10 Hz				10 Hz				10 Hz				10 Hz		
	0.3 m PUR cable with M8 connector, 3-pin				0.3 m PUR cable with M8 connector, 3-pin				0.3 m PUR cable with M8 connector, 3-pin				2 m PUR cable, 3×0.34 mm²		



	M18×1				R3/8"				NPTF3/8"			
	BCS006H BCS S01T401-PSCFNG-KM16-T02	**BCS006J** BCS S01T401-POCFNG-KM16-T02	**BCS006K** BCS S01T401-NSCFNG-KM16-T02	**BCS006L** BCS S01T401-NOCFNG-KM16-T02	**BCS006M** S02T401-PSCFNG-KM16-T02	**BCS006N** S02T401-POCFNG-KM16-T02	**BCS006P** S02T401-NSCFNG-KM16-T02	**BCS006R** S02T401-NOCFNG-KM16-T02	**BCS00A6** S03T401-PSCFNH-KM16-T02	**BCS00A7** S03T401-POCFNH-KM16-T02	**BCS00A8** S03T401-NSCFNH-KM16-T02	**BCS00A9** S03T401-NOCFNH-KM16-T02
	Level adjustable				Level adjustable				Level adjustable			
	up to 10 bar				up to 10 bar				up to 10 bar			
	■				■				■			
		■				■				■		
			■				■				■	
				■				■				■
	–30...+125 °C				–30...+125 °C				–30...+125 °C			
	5 Hz				5 Hz				5 Hz			
	Screw terminals, 3×0.34 mm²				Screw terminals, 3×0.34 mm²				Screw terminals, 3×0.34 mm²			

High-pressure Rated Inductive Sensors
M5×0.5, M8×1, M12×1 M18×1

Size	M5×0.5									
Order code Part number	**BHS006U** BHS G409N-PSD10-EP02	**BHS006W** BHS G409N-POD10-EP02	**BHS006Y** BHS G409N-NSD10-EP02	**BHS006N** BHS G403N-PSD10-S26	**BHS006P** BHS G403N-POD10-S26	**BHS006R** BHS G403N-NSD10-S26	**BHS005H** BHS G408N-PSC10-S49	**BHS005F** BHS G408N-POC10-S49	**BHS005E** BHS G408N-NSC10-S49	
Length	32 mm			40.6 mm			47 mm			
Installation dimensions	Ø 4.2g6			Ø 4.2g6			Ø 4.2g6			
Pressure range	up to 500 bar			up to 500 bar			up to 500 bar			
Supply voltage	10...30 V			10...30 V			10...30 V			
Rated switching distance	1 mm			1 mm			1 mm			
PNP NO	■			■			■			
PNP NC		■			■			■		
NPN NO			■			■			■	
NPN NC										
Temperature range	–25...+80 °C			–25...+80 °C			–25...+80 °C			
Switching frequency	3 KHz			3 KHz			3 KHz			
Connection	2 m PUR cable, 3×0.1 mm²			M5 connector, 3-pin			M8 connector, 3-pin			

Size	M12×1									
Order code Part number	**BHS0023** BES 516-300-S164-S4-D	**BHS0032** BES 516-300-S262-S4-D	**BHS0033** BES 516-300-S265-S4-D	**BHS002Y** BES 516-300-S249-S4-D	**BHS005Y** BHS B249V-PSD15-S04	**BHS0063** BHS B400V-PSD15-S04	**BHS0061** BHS B265V-PSD15-S04	**BHS0021** BES 516-300-S162-S4-D	**BHS001L** BES 516-300-S135-S4-D	**BHS005R** BHS B135V-PSD15-S04
Length	138 mm	50 mm	56 mm					69 mm	78 mm	
Installation dimensions	Ø 10e7	Ø 10e7	Ø 10e7					Ø 10e7	Ø 10e7	
Pressure range	500 bar	500 bar	500 bar					500 bar	500 bar	
Supply voltage	10...30 V	10...30 V	10...30 V					10...30 V	10...30 V	
Rated switching distance	1.5 mm	1.5 mm	1.5 mm					1.5 mm	1.5 mm	
PNP NO	■	■	■	■	■	■	■	■	■	■
PNP complementary										
Temperature range	–25 ... +80 °C	–25 ... +90 °C	–25 ... +80 °C	–25 ... +80 °C	–25... +120 °C	–25... +120 °C	–25... +120 °C	–25 ... +80 °C	–25 ... +80 °C	–25... +120 °C
Switching frequency	1 kHz	2 kHz	2 kHz	2 kHz	400 Hz	400 Hz	400 Hz	2 kHz	1 kHz	400 Hz
Connection	M12 connector, 4-pin									



	M8 × 1											
	BHS0054 BHS A404N-PSC15-S49	**BHS0053** BHS A404N-POC15-S49	**BHS0052** BHS A404N-NSC15-S49	**BHS0051** BHS A404N-NOC15-S49	**BHS0050** BHS A402N-PSC15-S49	**BHS004Y** BHS A402N-NSC15-S49	**BHS004Z** BHS A402N-POC15-S49	**BHS004W** BHS A402N-NOC15-S49	**BHS0058** BHS A407N-PSD15-BP02	**BHS0057** BHS A407N-POD15-BP02	**BHS0056** BHS A407N-NSD15-BP02	**BHS0055** BHS A407N-NOD15-BP02
	45 mm				55 mm				31.3 mm			
	Ø 6.5g6				Ø 6.5g6				Ø 6.5g6			
	up to 500 bar				up to 500 bar				up to 500 bar			
	10...30 V				10...30 V				10...30 V			
	1.5 mm				1.5 mm				1.5 mm			
	■				■				■			
		■				■				■		
			■				■				■	
				■				■				■
	0...+80 °C				–25...+80 °C				–25...+80 °C			
	4 kHz				4 kHz				4 kHz			
	M8 connector, 3-pin				M8 connector, 3-pin				2 m PUR cable, 3×0.1 mm²			

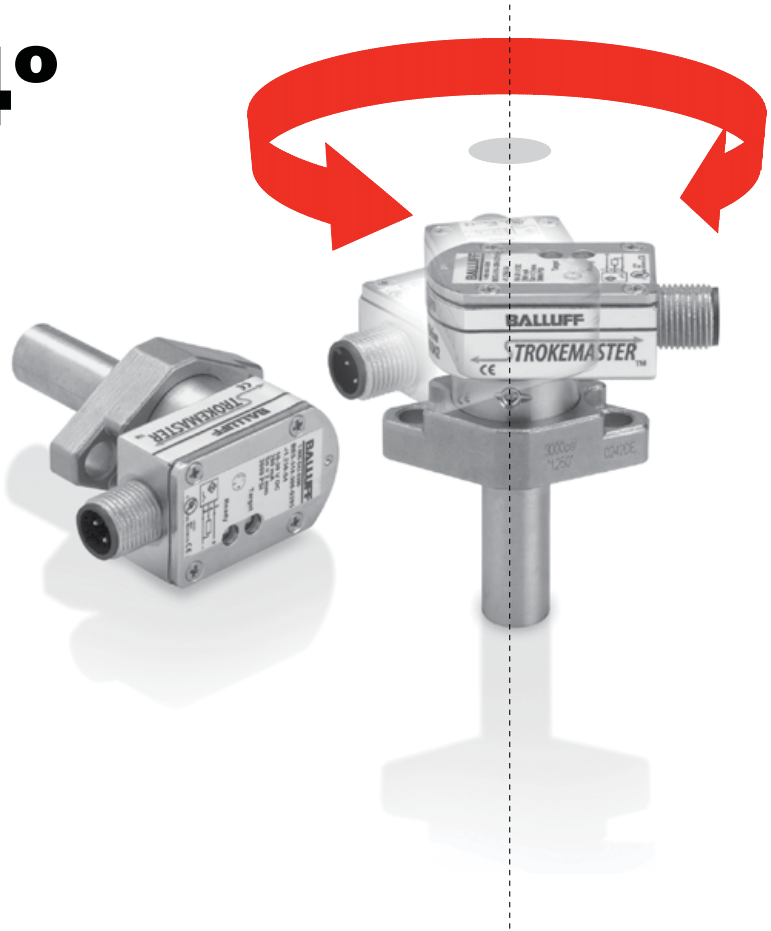
Temperature output

											M18×1			
	BHS005T BHS B135V-PSD15-S04-T01	**BHS0001** BES 516-100-S45-S4-D	**BHS0049** BES 516-300-S298-S4-D	**BHS0076** BHS B135V-PAD15-S04-007	**BHS0022** BES 516-300-S163-S4-D	**BHS004C** BES 516-300-S300-S4-D	**BHS0060** BHS B249V-PSD25-S04-003	**BHS0065** BHS B400V-PSD25-S04-003	**BHS0062** BHS B265V-PSD25-S04-003	**BHS005U** BHS B135V-PSD25-S04-003	**BHS004A** BES 516-300-S299-S4-D	**BHS004J** BES 516-300-S308-S4-D	**BHS0026** BES 516-300-S190-S4	**BHS0027** BES 516-300-S203
					93 mm		56 mm				55 mm		58 mm	61 mm
					Ø 10e7		Ø 10e7				Ø 15f6		Ø 16f7	Ø 16f7
					500 bar		500 bar							
					10...30 V		10...30 V							
					1.5 mm		2.5 mm	1.5 mm	2.5 mm	2.5 mm	1.5 mm		3 mm	3 mm
	■		■		■	■	■	■	■	■	■	■	■	■
		■		■										
	–25... +120 °C	–25...+80 °C		–25 ... +85 °C	–25...+80 °C		–25...+90 °C				–25 ...+80 °C		–25 ... +80 °C	–25 ... +80 °C
	400 Hz	1 kHz	1 kHz	1.5 kHz	1 kHz		400 Hz				2 kHz		400 Hz	1 kHz
											M12 connector, 4-pin			

High-pressure Rated Inductive Cylinder Sensors
Flange mount

Size	**23.165...115.8 mm**		
Part number	BES 516-300-S 295/0.912"...4.560"-S4	BES 516-200-S 2/0.912"...4.560"-S 21	BES 516-200-S 2/0.912"..4.560"S5
Pressure range	207 bar/3000psi	207 bar/3000psi	207 bar/3000psi
Supply voltage	10...30 V DC	20...250 V AC/DC	20...250 V AC/DC
Rated switching distance	2 mm	2 mm	2 mm
PNP NO	■	■	■
Temperature range	–25...+70 °C	–25...+70 °C	–25...+70 °C
Switching frequency	10 Hz	50 Hz	50 Hz
Connection	M12 connector, 4-pin BCC M415-0000-IA-003-EX44T2-020	1/2"-20UNF-2A plug connector, 3-pin C21-AE3-00-TY-060F	7/8"-16UN plug connector, 5-pin, BCC A314-0000-IO-003-EX44W6-020

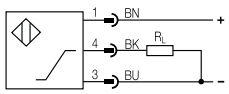
304°

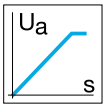


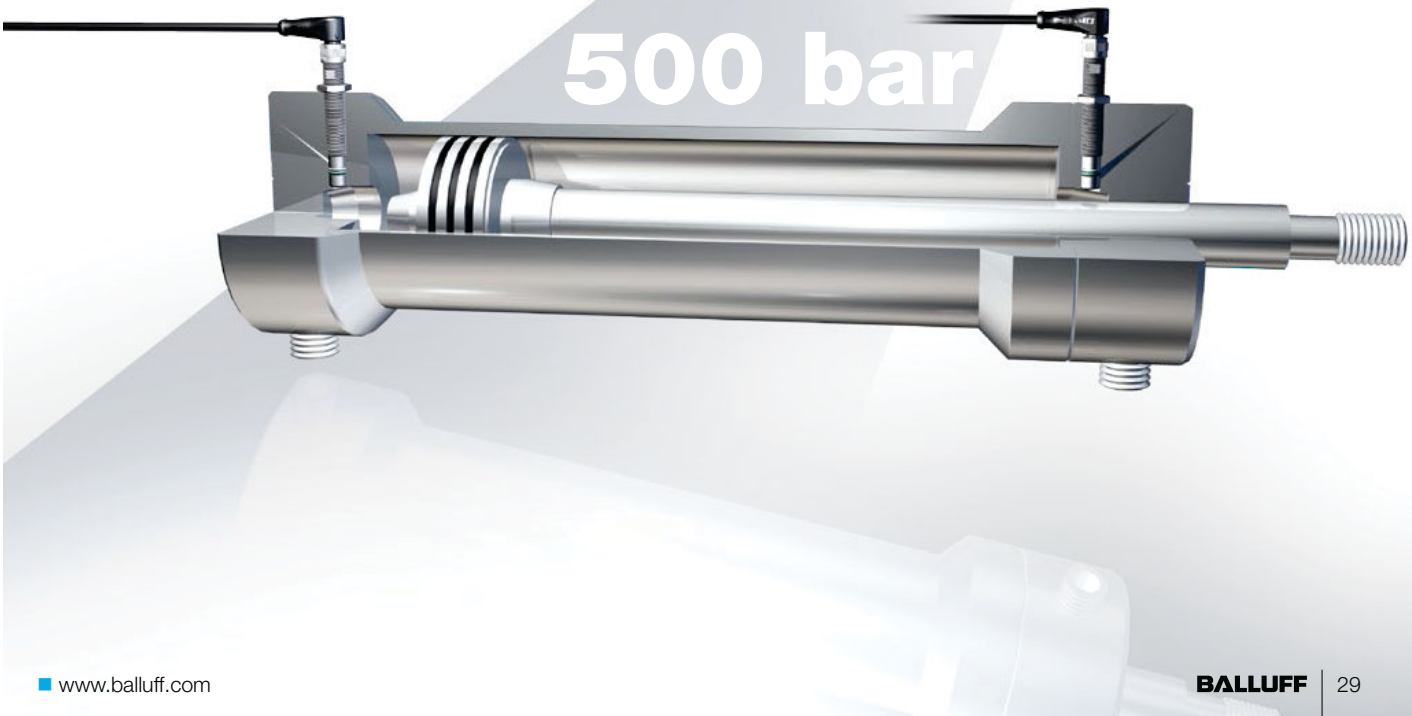
Size	**M12×1**
Order code Part number	**BAW0040** BAW Z08EO-UAD20B-S04G-H11
Length	78.1 mm
Installation dimensions	Ø 10e7
Designation	
Pressure range	500 bar
Supply voltage	15...30 V
Output signal	0...10 V
Repeat accuracy R_{BWN}	±8.0 µm
Limit frequency	1 kHz
Measuring range	0.5... 2 mm
Temperature range	–25...+85 °C
Connection	M12 connector, 3-pin

Wiring diagram

Connector, voltage output







Size		Micro-Electro-Mechanical Systems (MEMS)									
Order code Part number		**BSI000J** BSI Q41K0-XB-MXS015-S92	**BSI000K** BSI Q41K0-XB-MXS030-S92	**BSI000P** BSI Q41K0-XB-MXS045-S92	**BSI000R** BSI Q41K0-XB-MXS090-S92	**BSI000H** BSI Q41K0-XB-MXP360-S92	**BSI000M** BSI Q41K0-XA-MXS015-S92	**BSI000N** BSI Q41K0-XA-MXS030-S92	**BSI000T** BSI Q41K0-XA-MXS045-S92	**BSI000U** BSI Q41K0-XA-MXS090-S92	**BSI000L** BSI Q41K0-XA-MXP360-S92
Supply voltage		10...30 V DC					10...30 V DC				
Number of axis		1	1	1	1	1	1	1	1	1	1
Measuring range	15°	■					■				
	30°		■					■			
	45°			■					■		
	90°				■					■	
	360°					■					■
Accuracy		0.6°	0.6°	0,8°	0.8°	1.0°	0.6°	0.6°	0.8°	0.8°	1.0°
Resolution		0.09°					0,09°				
Output signal		4...20 mA					0...10 V				
Housing		PBTP					PBTP				
Dimensions		40×40×25 mm					40×40×25 mm				
Temperature range		–25...+85 °C					–25...+85 °C				
Connection		M12 connector, 5-pin					M12 connector, 5-pin				

Size		Micro-Electro-Mechanical Systems (MEMS)									
Order code Part number		**BSI001E** BSI R65K0-XB-MXS015-S115	**BSI0018** BSI R65K0-XB-MXS030-S115	**BSI0019** BSI R65K0-XB-MXS045-S115	**BSI001A** BSI R65K0-XB-MXS090-S115	**BSI0015** BSI R65K0-XB-MXP360-S115	**BSI001C** BSI R65K0-XA-MXS015-S115	**BSI0017** BSI R65K0-XA-MXS030-S115	**BSI001F** BSI R65K0-XA-MXS045-S115	**BSI0005** BSI R65K0-XA-MXS090-S115	**BSI0016** BSI R65K0-XA-MXP360-S115
Supply voltage		10...30 V DC					10...30 V DC				
Number of axes		1	1	1	1	1	1	1	1	1	1
Measuring range	15°	■					■				
	30°		■					■			
	45°			■					■		
	90°				■					■	
	360°					■					■
Accuracy		0.2°	0.2°	0.2°	0.2°	0.25°	0.2°	0.2°	0.2°	0.2°	0.25°
Resolution		0.01°					0.01°				
Output signal		4...20 mA					0...10 V				
Housing		PBTP					PBTP				
Dimensions		60×50×27 mm					60×50×27 mm				
Temperature range		–40...+85 °C					–25...+85 °C				
Connection		M12 connector,8-pin					M12 connector,8-pin				

	BSI000W BSI Q41K0-XB-MYS015-S92	**BSI000Y** BSI Q41K0-XB-MYS030-S92	**BSI0011** BSI Q41K0-XB-MYS045-S92	**BSI0012** BSI Q41K0-XB-MYS090-S92	**BSI000Z** BSI Q41K0-XA-MYS015-S92	**BSI0010** BSI Q41K0-XA-MYS030-S92	**BSI0013** BSI Q41K0-XA-MYS045-S92	**BSI0014** BSI Q41K0-XA-MYS090-S92
	10...30 V DC				10...30 V DC			
	2	2	2	2	2	2	2	2
	■				■			
		■				■		
			■				■	
				■				■
	0.6°	0.6°	0.8°	0.8°	0.6°	0,6°	0.8°	0.8°
	0.09°				0.09°			
	4...20 mA				0...10 V			
	PBTP				PBTP			
	40×40×25 mm				40×40×25 mm			
	–25...+85 °C				–25...+85 °C			
	M12 connector, 5-pin				M12 connector, 5-pin			

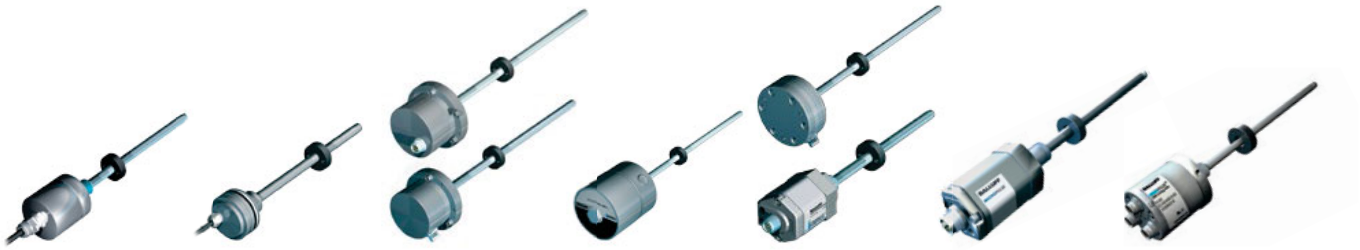
	BSI0006 BSI R65K0-XB-MYS015-S115	**BSI0007** BSI R65K0-XB-MYS030-S115	**BSI0008** BSI R65K0-XB-MYS045-S115	**BSI0009** BSI R65K0-XB-MYS090-S115	**BSI000A** BSI R65K0-XA-MYS015-S115	**BSI000C** BSI R65K0-XA-MYS030-S115	**BSI000E** BSI R65K0-XA-MYS045-S115	**BSI000F** BSI R65K0-XA-MYS090-S115	**BSI0002** BSI R11A0-XB-CXS045-S75G	**BSI0004** BSI R11A0-XB-CXP360-S75G	**BSI0003** BSI R11A0-XXR-CXP360-S75G
	10...30 V DC				10...30 V DC				**Capacitive**		
	2	2	2	2	2	2	2	2	0...30 V DC		
	■				■				1	1	1
		■				■					
			■				■		■		
				■				■			
										■	■
	0.12°	0.12°	0.2°	0.2°	0.12°	0.12°	0.2°	0.2°	0.1°	0.1°	0.1°
	0.01°				0.01°				0.01°		
	4...20 mA				0...10 V				4...20 mA	4...20 mA	Modbus
	PBTP				PBTP				Aluminum		
	60×50×27 mm				60×50×27 mm				79×21×28 mm		
	–25...+85 °C				–25...+85 °C				–40...+85 °C		
	M12 connector,8-pin				M12 connector,8-pin				M8 connector, 4-pin		

Micropulse Transducers
Product overview

Series	Profile style	Profile style	Profile AT	Profile BIW	Rod	Rod Compact	
Design	**P**	**PF**	**A1**	**P1**	**B, A, Z, Y**	**H, K, W**	
Installation version e.g. in hydraulic cylinders					■	■	
External fitting version e.g. on machine frames	■	■	■	■			
Application area	Pressing					Power plants, saw-mills, tunnel drilling machines	
Special Properties	Standard	Flat Design		Extremely fast	Standard	Stainless steel head	
Special approvals							
Position Magnets	Floating/cap-tive	Floating/cap-tive	Floating	Captive push rod	Free or floating	Free or floating	
Multi-position encoder	■		■		■		
Interfaces							
Analog voltage 0...10 V,	■	■	■	■	■	■	
Analog voltage 10...0 V	■	■	■	■	■	■	
Analog voltage –10 V...+10 V	■	■	■	■	■	■	
Analog current 4...20 mA	■	■		■	■	■	
Analog current 0...20 mA	■	■		■	■	■	
SSI	■				■	■	
SSI-SYNC	■				■	■	
CANopen	■				■	■	
DeviceNet	■						
Profibus DP	■				■		
Start/stop pulse interface	■		■		■		
VARAN			■				
EtherCAT	■		■		■		
IO-Link		■					

For information on our micropulse transducers BTL and BIW, refer to our new catalog or visit our website at **www.balluff.us**

MICROPULSE®



	Rod Pro Compact	Rod AR	Rod DEX	Rod J-DEXC TA12	Rod NEX	Rod high-pressure resistant NEX	Rod Redundant
	HB/WB	E2/E28	B/J	C	K, B, Z	CD	T
	■	■	■	■	■	■	■
	Offshore, steel hydraulics engineering, steel mills	Mobile working machines	Oil, gas, steel mills	Offshore, oil and gas	Power plants	Heavy-duty cylinders	Ship technology, power plants
	Outdoor system	Vehicle approval	Hazardous area approved	Hazardous area approved	Hazardous area approved	High-pressure resistant rated to 1000 bar	Increased safety
	IP 69K Stainless steel 1.4404 Seawater-resistant	KBA, e1	Flameproof "d," Zone 0/1, Zone 22, ATEX, IECex, KC, EAC	Flameproof "d," Zone 0/1, Zone 20, ATEX, IECex, CSA NEC	Ignition protection type "n" Zone 2, Zone 21, ATEX, IECex, CSA	Ignition protection type "n" Zone 2, Zone 21, ATEX	2 or 3 times redundant
	Free or floating	Free or floating	Free or floating	Free or floating	Free or floating		Free or floating
	■	■	■	■	■	■	■
	■	■	■	■	■	■	■
	■	■	■	■	■	■	■
	■	■	■	■	■	■	■
	■		■	■		■	
			■	■			
	■			■			
				■			
	■	■	■	■	■	■	■

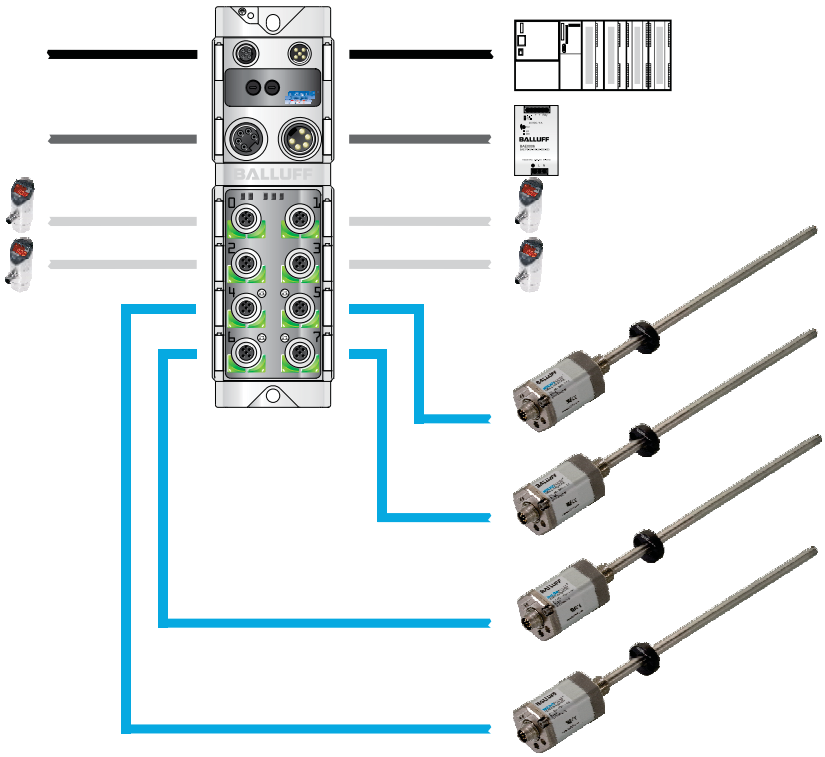
Fieldbus Modules P111

For easy connection of Micropulse transducers

Fieldbus/version	Profibus/4× P111, 8× DI	Profibus/4× P111, 4× AI (0...10 V/4...20 mA)
Order code Part number	**BNI0064** BNI-PBS-551-001-Z001	**BNI0065** BNI-PBS-552-001-Z001
Inputs	digital	Analog
No. of I/O ports	8	8
No. of digital inputs	8 PNP	
No. of analog inputs		4 (0...10 V/4...20 mA)
No. of P111 inputs	4	4

Profibus modules P111 are designed for connecting Micropulse transducers. Profibus modules P111 fulfill the highest mechanical standards through their resistant metal housing.

The modules are fitted with four independent ports to separately connect four Micropulse transducers BTL. A maximum of 16 position encoders can be used per BTL port. The maximum rated length measures 7500 mm. Depending on design, four additional ports can be assigned digital or analog sensors.



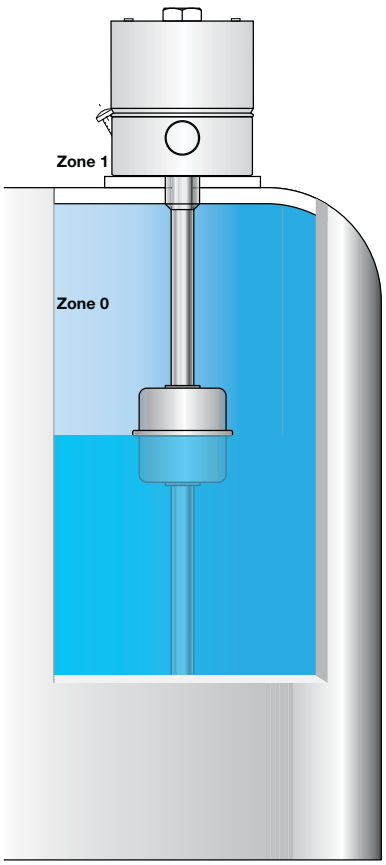
For information on our micropulse transducers BTL and BIW, refer to our catalog or visit our website at **www.balluff.us**

Filling Level Sensor in Zone 0/1
Reliably measure oil level

Float Zone 0




Description	**Parabolic float**	**Ball float**	**Cylindrical float**	**Cylindrical float**
for Series	Rod BTL	Rod BTL	Rod BTL	Rod BTL
Order code Part number	**BAM014E** BTL2-S-6216-8P-Ex	**BAM014A** BTL2-S-5113-4K-Ex	**BAM0147** BTL2-S-4414-4Z-Ex	**BAM0148** BTL2-S-4414-4Z01-Ex
Immersion depths given ρ **= 1 g/cm³(H_2O)**	s_s ~ 41 mm	s_s ~ 26 mm	s_s ~ 30 mm	s_s ~ 45 mm
Immersion depths given ρ **= 0.7 g/cm³**	s_s ~ 57 mm	s_s ~ 40 mm	s_s ~ 39 mm	submerges
Operating temperature	–20...+130 °C	–20...+120 °C	–20...+120 °C	–20...+120 °C



Series	**Rod J-DEXC-TA12**
Part number	BTL5-_ _-M_ _ _ _-J-DEXC-TA12
Shock load	100 g/6 ms as per EN 60068-2-27
Vibration	12 g, 10...2000 Hz as per EN 60068-2-6
Operating temperature	–40...+80°C for T5
Storage temperature	–40...+100°C outside of Ex zone
Degree of protection	IP 68
Housing material	Stainless steel, 304
Protective tube	Stainless steel, 316
Pressure rating	600 bar max.
Connection	Screw terminals
Cable entry	1/2"-14 NPT conduit entry
EMC testing	
Radio interference emission	EN 55016-2-3 (industrial and residential area)
Static electricity (ESD)	EN 61000-4-2 Severity level 3
Electromagnetic fields (RFI)	EN 61000-4-3 Severity level 3
Electrical fast transient bursts	EN 61000-4-4 Severity level 3
Conducted interference induced by high-frequency fields	EN 61000-4-6 Severity level 3

Pressure Sensors

Pressure transmitters
Current variants 4...20 mA
Voltage variants 0...10 V DC

Current variants 4...20 mA

Order code Part number		**BSP00FW** BSP V002-DV004-A06A1A-S4	**BSP00H1** BSP B010-DV004-A06A1A-S4	**BSP00H5** BSP B250-DV004-A06A1A-S4	**BSP00F3** BSP B400-DV004-A06A1A-S4	**BSP00H6** BSP B600-DV004-A06A1A-S4	**BSP00H7** BSP V002-FV004-A06A1A-S4	**BSP00HC** BSP B010-FV004-A06A1A-S4	**BSP00HJ** BSP B250-FV004-A06A1A-S4	**BSP00HK** BSP B400-FV004-A06A1A-S4	**BSP00HL** BSP B600-FV004-A06A1A-S4
Supply voltage U_S		8...32 V DC					8...32 V DC				
Length		76 mm					76 mm				
–1...2 bar (–14.5...29 psi)		■					■				
0...10 bar (0...145 psi)			■					■			
0...250 bar (0...3626 psi)				■					■		
0...400 bar (0...5802 psi)					■					■	
0...600 bar (0...8702 psi)						■					■
Ambient/media temperature		**–40…+85 °C/–40...+125 °C**					**–40…+85 °C/–40...+125 °C**				
Connection	Connectors	M12 connector, 4-pin					M12 connector, 4-pin				
	Process connection	**G1/4"**					**1/4" NPT**				

Voltage variants 0...10 V DC

Order code Part number		**BSP00JE** BSP V002-DV004-A04A1A-S4	**BSP00JK** BSP B010-DV004-A04A1A-S4	**BSP00JP** BSP B250-DV004-A04A1A-S4	**BSP00JR** BSP B400-DV004-A04A1A-S4	**BSP00JT** BSP B600-DV004-A04A1A-S4	**BSP00JU** BSP V002-FV004-A04A1A-S4	**BSP00KO** BSP B010-FV004-A04A1A-S4	**BSP00K4** BSP B250-FV004-A04A1A-S4	**BSP00K5** BSP B400-FV004-A04A1A-S4	**BSP00K6** BSP B600-FV004-A04A1A-S4
Supply voltage U_B		10...30 V DC					10...30 V DC				
Length		76 mm					76 mm				
–1...2 bar (–14.5...29 psi)		■					■				
0...10 bar (0...145 psi)			■					■			
0...250 bar (0...3626 psi)				■					■		
0...400 bar (0...5802 psi)					■					■	
0...600 bar (0...8702 psi)						■					■
Ambient/media temperature		**–40…+85 °C/–40...+125 °C**					**–40…+85 °C/–40...+125 °C**				
Connection	Connectors	M12 connector, 4-pin					M12 connector, 4-pin				
	Process connection	**G1/4"**					**1/4" NPT**				

	BSP00HM BSP V002-KV004-A06A1A-S4	**BSP00HT** BSP B010-KV004-A06A1A-S4	**BSP00HZ** BSP B250-KV004-A06A1A-S4	**BSP00J0** BSP B400-KV004-A06A1A-S4	**BSP00J1** BSP B600-KV004-A06A1A-S4	**BSP00J2** BSP V002-HV004-A06A1A-S4	**BSP00J6** BSP B010-HV004-A06A1A-S4	**BSP00J9** BSP B250-HV004-A06A1A-S4	**BSP00JA** BSP B400-HV004-A06A1A-S4	**BSP00JC** BSP B600-HV004-A06A1A-S4
8...32 V DC	■									
76 mm		■								
			■							
				■						
					■					
8...32 V DC						■				
74.5 mm							■			
								■		
									■	
										■
–40…+85 °C/–40...+125 °C										
M12 connector, 4-pin										
R1/4"										
G1/2"										

	BSP00K7 BSP V002-KV004-A04A1A-S4	**BSP00KC** BSP B010-KV004-A04A1A-S4	**BSP00KJ** BSP B250-KV004-A04A1A-S4	**BSP00KK** BSP B400-KV004-A04A1A-S4	**BSP00KL** BSP B600-KV004-A04A1A-S4	**BSP00KM** BSP V002-HV004-A04A1A-S4	**BSP00KT** BSP B010-HV004-A04A1A-S4	**BSP00KZ** BSP B250-HV004-A04A1A-S4	**BSP00L0** BSP B400-HV004-A04A1A-S4	**BSP00L1** BSP B600-HV004-A04A1A-S4
10...30 V DC	■									
76 mm		■								
			■							
				■						
					■					
10...30 V DC						■				
76 mm							■			
								■		
									■	
										■
–40…+85 °C/–40...+125 °C										
M12 connector, 4-pin										
R1/4"										
G1/2"										

PNP pressure sensors

IO-Link
Two programmable switching points (NO or NC)

IO-Link
One programmable switching point and analog output 0...10 V DC

Order code Part number		**BSP00CF** BSP V002-EV003-D00S1B-S4	**BSP00CL** BSP B010-EV003-D00S1B-S4	**BSP00CR** BSP B250-EV003-D00S1B-S4	**BSP00CT** BSP B400-EV003-D00S1B-S4	**BSP00CU** BSP B600-EV003-D00S1B-S4	**BSP00AM** BSP V002-EV003-A00S1B-S4	**BSP00AT** BSP B010-EV003-A00S1B-S4	**BSP00AZ** BSP B250-EV003-A00S1B-S4	**BSP00C0** BSP B400-EV003-A00S1B-S4	**BSP00C1** BSP B600-EV003-A00S1B-S4
Supply voltage U_B		18...36 V DC					18...36 V DC				
Length		94 mm					94 mm				
–1...2 bar (–14.5...29 psi)		■					■				
0...10 bar (0...145 psi)			■					■			
0...250 bar (0...3626 psi)				■					■		
0...400 bar (0...5802 psi)					■					■	
0...600 bar (0...8702 psi)						■					■
Ambient/media temperature		**–40…+85 °C/–40...+125 °C**					**–40…+85 °C/–40...+125 °C**				
Connection	Connectors	M12 connector, 4-pin					M12 connector, 4-pin				
	Process connection	Internal thread G1/4" in accordance with DIN EN 3852					Internal thread G1/4" in accordance with DIN EN 3852				

Adapters for different process connections

Manometer screw connection in accordance with EN 837

Description		**Adapter G1/4"**	**Adapter G1/4"**	**Adapter G1/2"**
Order code Part number		**BAM01KP** BAM AD-SP-008-1G4/1G4-4	**BAM01KR** BAM AD-SP-008-1G4/1G4-4-EN837	**BAM01UJ** BAM AD-SP-008-1G4/1G2-4
Housing material		Stainless steel	Stainless steel	Stainless steel
Connection	Sensor-side	G1/4" in accordance with DIN EN 3852	G1/4" in accordance with DIN EN 3852	G1/4" in accordance with DIN EN 3852
	Process-side	G1/4" in accordance with DIN EN 3852	G1/4" in accordance with DIN EN 837	G1/2" in accordance with DIN EN 3852

IO-Link

One programmable switching point and analog output 4...20 mA

	BSP00A7 BSP V002-EV003-A02S1B-S4	**BSP00AC** BSP B010-EV003-A02S1B-S4	**BSP00AJ** BSP B250-EV003-A02S1B-S4	**BSP00AK** BSP B400-EV003-A02S1B-S4	**BSP00AL** BSP B600-EV003-A02S1B-S4
	18...36 V DC				
	94 mm				
	■	■	■	■	■
	–40…+85 °C/–40...+125 °C				
	M12 connector, 4-pin				
	Internal thread G1/4" in accordance with DIN EN 3852				

For information about our pressuresensors BSP, refer to ourcatalog or look online at **www.balluff.us**

Internal thread

	Adapter M20×1.5	**Adapter R1/4"**	**Adapter 1/4" NPT**	**Adapter ¼" NPT**
	BAM0209 BAM AD-SP-008-1G4/M20X1,5-4	**BAM01RP** BAM AD-SP-008-1G4/1R4-4	**BAM01KT** BAM AD-SP-008-1G4/1N4-4	**BAM01TR** BAM AD-SP-011-1G4/1N4-4
	Stainless steel	Stainless steel	Stainless steel	Stainless steel
	G1/4" in accordance with DIN EN 3852	G1/4" in accordance with DIN EN 3852	G1/4" in accordance with DIN EN 3852	G1/4" in accordance with DIN EN 3852
	M20×1.5	R1/4"	1/4" NPT	Internal thread 1/4" NPT

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